FACT SHEET FOR NPDES PERMIT
NO. WA-002097-4

CITY OF LEAVENWORTH POTW
April 16, 2010

PURPOSE OF THIS FACT SHEET

This fact sheet explains and documents the decisions Ecology made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for City of Leavenworth Publically-Owned Treatment Works (POTW).

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit *and accompanying fact sheet* for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for City of Leavenworth, NPDES Permit Number WA-002097-4, are available for public review and comment from **June 9, 2010** until **July 9, 2010**. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement**.

The City of Leavenworth reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this Fact Sheet as **Appendix D - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology will not revise the rest of the fact sheet, but the full document will become part of the legal history contained in the facility's permit file.

Richard Marcley prepared the permit and this fact sheet.

SUMMARY

The City of Leavenworth applied for reissuance of its NPDES permit for its publicly-owned treatment works (POTW). The POTW serves residential and commercial dischargers; there are no industrial dischargers to the system. In 1996, in response to actual and probable future violations of discharge effluent limits and occasional exceedances of design criteria, the City submitted a *Wastewater Facilities Plan* to Ecology. The *Facilities Plan* contained a comprehensive assessment of the treatment plant and collection system, and concluded with a similarly comprehensive list of recommended corrective actions. The recommendations included a dramatically upgraded treatment plant and implementation of a comprehensive corrective and preventative maintenance program for the collection system.

Completed improvements to the treatment plant include:

- An array of new equipment at the headworks to perform primary-level treatment of influent
- Expansion of activated sludge biological treatment processes, including a new aeration basin and anoxic selector tanks
- A third secondary clarifier
- An enhanced sludge handling system
- Ultraviolet (UV) disinfection
- Expanded onsite wastewater laboratory
- A new outfall
- Doubled design population from 2,020 to 3,849
- Provisions for phosphorus removal

Following an inspection conducted in September 2007, the City of Leavenworth corrected all the deficiencies found at the wastewater treatment plant. Of primary concern to Ecology is an issue the City had experienced for some time, excessive fats, oils and grease (FOG). The City has demonstrated a 70% decrease in FOG since the allocation of a part-time position dedicated to FOG abatement in 2008.

The proposed permit requires the City to:

- Comply with the established effluent limits.
- Routinely submit monitoring data of influent and effluent characteristics.
- Submit assessments of treatment plant loadings.
- Evaluate infiltration and inflow.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the State of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to municipal NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Technical criteria for discharges from municipal wastewater treatment facilities (chapter 173-221 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC) and for ground waters (chapter 173-200 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of Plans and Reports for Construction of Wastewater Facilities (Chapter 173-240 WAC)

These rules require any treatment facility operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See **Appendix A—*Public Involvement*** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit. Ecology will summarize the responses to comments and any changes to the permit in **Appendix D.**

BACKGROUND INFORMATION

TABLE 1 - GENERAL FACILITY INFORMATION

Applicant	City of Leavenworth
Facility Name and Address	City of Leavenworth Publicly-Owned Treatment Works near Commercial and 14th Street Leavenworth, WA 98826
Type of Treatment	Activated sludge, oxidation/aeration, secondary clarification, ultraviolet (UV) disinfection
Discharge Location	Wenatchee River approximate river mile 35 Latitude: 47.59744 N. Longitude: -120. 6518 W.

Figure 1: Facility Location Map

FACILITY DESCRIPTION

The City of Leavenworth owns and operates a wastewater collection system and an activated sludge, oxidation/aeration wastewater treatment plant. The plant uses secondary clarification

with ultraviolet (UV) disinfection treatment facilities. The wastewater treatment plant serves residential and commercial customers within City limits of Leavenworth.

History

Prior to 1994 the treatment plant reached, and on occasion exceeded, its design capacity. The City determined that the treatment plant did not have the capability to meet receiving water standards for toxic constituents. In addition, projected significant population growth over the next 20 years for the City, placed further demand on the aging wastewater services. Furthermore, the collection system had several major deficiencies, with portions over 50 years old and reaching the end of their service life.

In response to the situation, the City contracted with Varela & Associates, Inc. in September 1994 to prepare a *Wastewater Facilities Plan*, completed in April 1996. The plan recommended a comprehensive program of collection system rehabilitation and maintenance, including separation of storm sewers from the sanitary sewer system, expansion and upgrade of the treatment plant, including an improved sludge management program, ultraviolet (UV) disinfection and enhanced treatment capacities. The City based improvements in the *Facilities Plan* on a 20 year planning horizon (1995 to 2015), when the plan predicts the service population to increase from 2020 to 4483.

The final *Wastewater Facilities Plan, April 1996,* and the *Summary of Design, December 1997* contain 26 technical memoranda detailing improvements, which is the primary source of information Ecology used for this fact sheet. Ecology detailed only the main points of the plan in this fact sheet; you may obtain further information by referring to the plan document itself. The fact sheet references specific sections, in Roman numerals, and pages, in Arabic numerals, of the plan as appropriate.

Collection System Status

The City has completed some of the recommendations to rehabilitate and upgrade the collection system, but will complete other elements of the program as time and money allow. The collection system is described in relatively detailed terms in the following section.

The City constructed the first sewer system in 1934 in the area between Front Street and the Wenatchee River. In 1947, it completed the original combined storm and sanitary sewer system for the rest of the community. Between 1971 and 1973, Leavenworth undertook a major project to separate the storm water flows from the sanitary flows by constructing a separate storm sewer system. The storm water separation project included replacement of many sanitary sewer mains where the new storm sewers were placed below them which resulted in a number of shared access manholes with separate flow channels for storm and sanitary sewage.

The original storm water separation project did not completely eliminate storm water inflow, nor provide all the separate storm sewers needed. The project also had problems with the new storm and sanitary lines due to faulty construction. As a result, the City completed additional work on both systems, with additional projects correcting the worst problems and continued separation of the storm sewer system.

The sanitary sewer system consists of approximately 46,000 feet of gravity lines ranging in size from 6 to 18 inches. Most of the system consists of the original concrete pipe plus a large amount of asbestos cement pipe used to replace the concrete pipe during the storm water separation project. More recent sewer installations and extensions used PVC pipe. The sanitary sewer system has essentially two main interceptor/trunk systems: one serving the north side of the City, and the other serving the south and west sides of the City.

The collection system is a gravity system except for lift stations at Bayern Village, Water Front Park, and Enchantment Park. All three stations are reportedly in satisfactory working order and appear to have sufficient pumping capacity.

Deficiencies identified in the Facilities Plan included: sags in mains, suspected broken side sewers, sedimentation in mains, grease from restaurants, and tree root intrusions. Although the problems are of concern, they have apparently not resulted in serious problems or extended interruptions in service within the collection system in recent years. There have been several manhole overflows due to blockage, which were quickly cleared. The City has signed a contract to implement a program of TV inspection of the system to identify areas of needed repair or replacement *(Facilities Plan, III-1, 2).* Inspections are conducted as time and circumstances allow.

Treatment Processes

Treatment of wastewater begins at the headworks, which consists of a mechanical grinder (Muffin Monster), grit removal and a rotating screen. Biological treatment begins with an anoxic process. The City partially converted an old oxidation ditch into an anoxic conditioning tank, or selector, to improve sludge settling characteristics and converted the remainder of the ditch to into an aerated sludge storage tank. After anoxic treatment, wastewater flows to a newly-constructed oxidation ditch aeration basin. After aeration, wastewater undergoes secondary clarification, followed by ultraviolet disinfection and discharge to the receiving water.

Improvements to each of the treatment plant's major components, and some major operating parameters and design issues are briefly described below:

Headworks

The City constructed a new headworks building and installed, improved, or replaced the following components during the 2000-2005 permit term:

- Mechanically-cleaned bar rack
- Comminutor
- Fine screening
- Grit removal
- Flow metering
- Flow distribution
- Automatic compositing sampler

Selector/Sludge Storage Tanks

Leavenworth demolished oxidation ditch number 1 and converted oxidation ditch number two to use a portion of its volume as an anoxic conditioning tank, or selector, to improve sludge settling characteristics. The selector works by subjecting activated sludge to conditions that are detrimental to undesirable microorganisms (those that do not settle well or impede settling), and encourage the growth of well-settling microorganisms. The lack of free oxygen in the selector tank is the anoxic condition that selects for the desired microorganisms. The anoxic selector also promotes the conditions necessary for denitrification of the wastewater.

The City converted the remainder of the tank into an aerated sludge storage tank. Installation of coarse-bubble diffusers assures adequate mixing of tank contents and helps prevent odor problems. Sludge is removed from the tank by pumping directly to the belt filter press.

It also constructed a new oxidation ditch basin. The biological treatment system is designed to achieve complete nitrification throughout the year with relatively minor modifications.

Aeration Basin

Biological treatment of wastewater occurs in the aeration basin. The new aeration basin with a volume of approximately 750,000 gallons is equipped with two variable-speed 50 hp aerators. The activated sludge system operates at a relatively low rate by design, with a solids retention time (SRT) of approximately 30 days in cold weather. The basin has a relatively long SRT because minimum temperatures in Leavenworth's wastewater typically drop to 9º C, and at cold temperatures biological activity is slow. The SRT of the basin results in at least partial nitrification of incoming ammonia.

The nitrification process consumes alkalinity, which is already low in Leavenworth's wastewater. The operator controls alkalinity in the aeration basin either by changing the speed of the aerators

to control dissolved oxygen concentration in the basin (and thus the nitrification rate), or by adjusting alkalinity in the basin by the addition of soda ash (or other chemical).

Secondary Clarifiers

The new plant utilizes two existing peripheral-fed, center weir, 32-foot diameter clarifiers. Due to age and wear, the City refurbished their component parts and the associated sludge piping. Each clarifier contains a mechanism to plow settled sludge to the center of the tank, where it is removed for recycle to the aeration basin, or wasted to the sludge storage and dewatering facilities. The City included a third clarifier as part of the upgrade because the existing units would not provide adequate capacity for design loads. The operator can take each clarifier on or off line individually.

The new unit, Clarifier #3, operates in parallel with the other clarifiers. The new clarifier is a 40-foot diameter center feed, with a peripheral effluent weir and center sludge withdrawal. The design of the new unit allows for chemical addition for phosphorus removal, if necessary.

Disinfection

During the 2000-2005 permit term, the City removed the chlorination disinfection system and installed an ultraviolet (UV) system. The system consists of 160 low pressure, low intensity, mercury vapor lamps, which provide radiation output of a wavelength that is most harmful to pathogens. Lamps are arrayed in four "banks" operated in series. Water surface level is controlled by an automatic level control gate that maintains a nearly constant water level for all anticipated flows.

Discharge Outfall

As part of the upgrade, the City completely replaced its outfall pipe and diffuser. The fact sheet associated with the 2000-2005 permit term cited the outfall as deficient because it was not submerged during critical (low flow) receiving water conditions. The *Facilities Plan* recommended extending the old outfall pipe, but subsequent investigation revealed this pipe and the outfall structure had limited hydraulic capacity.

During design, the City also evaluated the ability of the treatment plant to discharge the design peak flow during river flood conditions. The UV disinfection building floor elevation was the controlling upstream element in evaluating required outfall pipe design. The main concern was that during a 100-year flood event the effluent would not surcharge or back up into the UV disinfection system, resulting in ineffective disinfection of the discharge. The new outfall is designed so that surcharging "will only occur when peak sewage flow and river flood crest coincide . . . when the river has significant dilution capability" (*Summary of Design*, Tech. Memo. TM16, p. 5).

The outfall consists of 16-inch ductile iron pipe culminating in a single-port diffuser. The end of the pipe is placed upstream of a large submerged boulder "for protection and to enhance conditions for fish habitat" (*Summary of Design,* Tech. Memo. TM16, p. 3). According to the permit application the discharge point into the Wenatchee River is approximately 69 feet from the shore and 15.24 feet below the stream surface during critical conditions. However, Ecology used the 7Q10 depth of the river (3 feet) in the dilution model.

Solid Wastes

The City has historically, and plans to continue to dispose of its untreated sewage sludge at the Chelan and Douglas County Landfill when necessary. It plans to continue to haul its biosolids to the Chelan County Composting Site during the months the facility operates. The City contracted with Varela & Associates, Inc and Esvelt Environmental Engineering to conduct a biosolids utilization study as part of the *Facilities Plan*. Phase 1 of the study examined a broad spectrum of alternatives to land filling the City's sludge. Alternatives were explored to treat sludge to either Class A or Class B biosolids.

The findings of the study and resulting recommendations are contained in *Biosolids Utilization,* Addendum No. 1 to the Facilities Plan, dated March 1999. The study concludes that the most cost-effective methods for utilization of treated biosolids were: Class A-containerized composting, and; Class B-air drying (*Biosolids Utilization, p. 6).* However, conclusion #3 states: "Both of the least cost alternatives . . . require significant capital and operating cost commitment on the part of the City." Ecology will continue to work with the City and Chelan County to help them achieve more beneficial use of the biosolids through composting and less landfill disposal.

Class A biosolids are suitable for unrestricted use by the public, due to pathogen reduction and other pollutant-reducing measures taken during processing. Class B biosolids may contain detectable levels of pathogens and other pollutants, but do not pose a health threat. The use of Class B biosolids is subject to more stringent site restrictions pertaining to harvesting, crop type, grazing, and public access.

PERMIT STATUS

Ecology issued the previous permit for this facility on March 23, 2005. The previous permit placed effluent limits on BOD, TSS, fecal coliform bacteria and pH.

The City of Leavenworth submitted an application for permit renewal on June 22, 2009. Ecology accepted it as complete on August 17, 2009.

SUMMARY OF COMPLIANCE WITH PREVIOUS PERMIT ISSUED

Ecology staff last conducted a non-sampling compliance inspection on February 26, 2009.

The Leavenworth POTW has complied substantially with the effluent limits and permit conditions throughout the duration of the permit issued on March 23, 2005**.** Ecology assessed compliance based on its review of the facility's discharge monitoring reports (DMRs) and on inspections conducted by Ecology.

WASTEWATER CHARACTERIZATION

Influent

The concentration of pollutants entering the POTW was reported in the discharge monitoring reports. The tabulated data represents the quality of the influent received at the POTW from May 2005 through November 2009. The effluent is characterized as follows:

Table 2: Influent Wastewater Characterization

Parameter	May 2005 to November 2009 **Characterization**		**% Design Criteria**
	Average	**Highest Monthly Average**	**Monthly Average for the Maximum Month**
Flow in MGD	0.362	0.452	53.8
BOD_5, in lbs/day	507.6	789.0	56.8
BOD_5, in mg/L	186.1	270.6	
TSS, in lbs/day	453.5	740.7	34.9
TSS, in mg/L	163.0	272.0	
Fats, Oil, and Grease, in mg/L	65.6	814 (July 2007)	

Fats, Oil, and Grease (FOG)

The City of Leavenworth has a long history of problems associated with FOG. Over the years, many raw sewage spills are attributable to FOG caused blockages in the collection system. In addition, the presence of FOG adds considerably to the work load at the wastewater treatment plant.

Ecology issued Consent Order # DE 03WQCR-5581 on June 17, 2003 requiring Leavenworth to develop a FOG elimination plan by August 1, 2003 and submit annual reports through 2006. Ecology issued the 2003 consent order following numerous incidents of missed samplings, inadequate staffing at the wastewater treatment plant and four discharges of untreated wastewater.

On July 28, 2006 Ecology issued Administrative Order #3448 requiring Leavenworth to take action regarding untreated sewer overflows at Barn Beach. Ecology expressed concern regarding a need for the City to upgrade and more actively implement its FOG abatement program.

On October 10, 2007 the City wrote to Ecology that it had made improvements to its samplers, installed a new effluent sampler, and made improvements to the Bayern and Enchantment Park Lift Stations. The City also added a halftime position at the wastewater treatment plant and funded another halftime position to manage its FOG abatement program beginning in January 2008.

Recent FOG data demonstrates the effectiveness of the FOG abatement program. From January 2008 to the present, the average monthly influent FOG concentration has declined by 32 % over the May 2005 to December 2007 time period. FOG monitoring will continue in the proposed permit to monitor the program's effectiveness.

Effluent

The concentration of pollutants in the discharge was reported in the NPDES application and in DMRs. The effluent is characterized as follows:

Table 3: Effluent Characterization

Parameter	May 2005 to November 2009 Characterization			% of Existing Permit Limits	
	Average	Max Monthly Average	Highest Weekly Average	Monthly Average[1]	Weekly Average [1]
Flow	0.349	0.453	0.810 (max day)	54	96
Temperature in Celsius [2]	20.9	23.7	25.4 (max day)	--	--
BOD_5, in mg/L	4.0	10.0	11.2	33.3	25.0
BOD_5, in lbs/Day	10.4	22.0	29.2	10.5	9.3
TSS, in mg/L	6.5	11.8	19.9	39.3	44.2
TSS, in lbs/Day	17.0	36.6	70.1	17.4	22.3
Ammonia, in mg/L	0.29	1.83	2.8	--	--
Ammonia, in lbs/Day	0.7	4.0	6.6	--	--
Total Phosphorus	3.3	7.0	--	--	--
pH, in standard units su	--	6 low to 8.5 high		Between 6 to 9 at all times	
Dissolved Oxygen, in mg/L	6.3	3.9 (lowest)	2.1(lowest)	--	--
Alkalinity, in mg/L	26.9	70.0	--	--	--
Hardness, in mg/L	50.5	75	--	--	--
Fecal Coliform Bacteria, in Geomean #colonies/100 mL	3.0	11.9	21	6.0	3.0

[1] Value is based on the highest monthly average or maximum day.
[2] The summer season is defined as June 1st to September 30th.

DESCRIPTION OF THE RECEIVING WATER

The Leavenworth POTW discharges to the Wenatchee River at approximately river mile 21. Other nearby point source outfalls include the Community of Peshastin, located approximately 5 miles downstream. Significant other nearby non-point sources of pollutants include domestic septic system drainfields, agricultural runoff, and stormwater runoff from highway U.S. 2.

The ambient background data used for this permit includes the following data taken from October 2000 through September 2008 by Ecology's Environmental Assessment Program.

Table 4: Ambient Background Data

Parameter	Value used
Temperature (highest annual 1-DADMax)	20.3 ^{o} C
Temperature criterion as assigned in Table 602 WIRA 45	16^{o} C
pH (Maximum / Minimum)	8.6 @95th %tile/6.8 @5th %tile
Dissolved Oxygen	8.5 mg/L Minimum
Total Ammonia-N	0.011 mg/L Maximum
Fecal Coliform	24
Alkalinity or Salinity	14 mg/L as CaCO3 Average

SEPA COMPLIANCE

Regulation exempts reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions are no less stringent than state rules and regulations. The exemption applies only to existing discharges, not to new discharges.

PROPOSED PERMIT LIMITS

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).

- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-

200 WAC), Sediment Quality Standards (chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36).

- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Nor does Ecology usually develop limits for pollutants that were not reported in the permit application but that may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. If significant changes occur in any constituent of the effluent discharge, the Leavenworth POTW is required to notify Ecology (40 CFR 122.42(a)). The Leavenworth POTW may be in violation of the permit until Ecology modifies the permit to reflect additional discharge of pollutants.

DESIGN CRITERIA

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology-approved design criteria for this facility's treatment plant were obtained from the City's approved 1996 *Wastewater Facilities Plan* engineering report prepared by Varela & Associates and are as follows:

Table 5: Design Standards for Leavenworth WWTP.

Parameter	Design Quantity
Monthly average flow (max. month)	0.84 MGD
BOD_5 influent loading	1390 lbs/day
TSS influent loading	2120 lbs/day
Design population equivalent	3,849

TECHNOLOGY-BASED EFFLUENT LIMITS

Federal and state regulations define technology-based effluent limits for municipal wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for municipal wastewater.

Chapter 173-221 WAC lists the following technology-based limits for pH, fecal coliform, BOD_5, and TSS:

Table 6: Technology-based Limits

Parameter	Limit
pH	The pH must measure within the range of 6.0 to 9.0 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD_5 (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L

The following technology-based limits for pH, Fecal Coliform Bacteria, BOD_5, and TSS were the most appropriate limits determined from: (1) WAC 173-220-130(3)(b); (2) WAC 173-221-030(11)(b); (3) WAC 173-221-040(1); (4) the recent *Facilities Plan* prepared by Varela & Associates, Inc., and (5) the Department's *Permit Writer's Manual*:

The technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly BOD_5 and TSS effluent mass loading (lbs/day)
Maximum monthly design flow (0.84 MGD) X 30 mg/L X 8.34 = 210 lbs/day.

Weekly BOD_5 and TSS effluent mass loading (lbs/day)
1.5 X Monthly BOD_5 effluent mass loading = 315 lbs/day.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITS

The Washington State Surface Water Quality Standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters.

Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (EPA 1992). These criteria are designed to protect humans from exposure to pollutants linked to cancer and other disease, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210,; 2006) in the State of Washington.

Antidegradation

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.
- For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards.

Ecology’s analysis described in this section of the fact sheet demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and use no more than 25% of the available width of the water body for dilution. Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derive any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent is 10% and the receiving water is 90% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life **acute** criterion is based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Each aquatic life **chronic** criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two liters/day for drinking water
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. Ecology must specify both the allowed size and location in a permit.

The proposed permit specifies the size and location of the allowed mixing zone.

For this discharge, the percent volume restrictions of the water quality standards resulted in a lower dilution factor than the distance and width restrictions. Therefore, the dilution factor calculated at a 10-year low flow was used to determine reasonable potential to exceed water quality standards.

2. The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.

Ecology has determined that the treatment provided at the City of Leavenworth POTW meets the requirements of AKART (see "Technology based Limits").

3. Ecology must consider critical discharge conditions.

Surface water quality-based limits are derived for the waterbody's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in

the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: http://www.ecy.wa.gov/biblio/92109.html.

Ecology modeled the dilution zones in preparation for the current permit there is no reason to conduct another analysis at this time.

Ecology used the following critical conditions to model the discharge:

- The seven-day-average low river flow with a recurrence interval of ten years (7Q10) 379 cfs.
- River depth of 3 feet at the 7Q10 period.
- River velocity of 1.3 ft per second.
- Manning roughness coefficient .045.
- Channel width of 150 feet.
- Maximum design criteria monthly effluent flow of 0.84 MGD for chronic mixing zone calculation.
- Maximum daily flow of 1.27 million gallons per day (MGD) for acute mixing zone.

Ecology obtained ambient data at critical conditions in the vicinity of the outfall from the City of Leavenworth's permit application, the US Geological Survey data (1930 to 1979) for the Wenatchee River near Leavenworth station and the Ecology Environmental Assessment Program.

4. Supporting information must clearly indicate the mixing zone would not:

- **Have a reasonable potential to cause the loss of sensitive or important habitat.**
- **Substantially interfere with the existing or characteristic uses.**
- **Result in damage to the ecosystem.**
- **Adversely affect public health.**

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under

critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of being discharged.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. The plume rises through the water column as it mixes, therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95^{th} percentile pollutant concentration, the 90^{th} percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

8. Acute Mixing Zone.

- **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**

  Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone at the seven day ten year low flow.

- **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

  As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- **Comply with size restrictions.**

  The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

DESIGNATED USES AND SURFACE WATER QUALITY CRITERIA

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). Criteria applicable to this facility's discharge are summarized below in Table 6.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for, the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 7: Aquatic Life Uses & Associated Criteria

Core Summer Habitat	
Temperature Criteria – Highest 7DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU
Total Dissolved Gas Criteria	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection
pH Criteria	pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units
Total Dissolved Gas Criteria	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection
pH Criteria	pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units

- The recreational uses are extraordinary primary contact recreation, primary contact recreation, and secondary contact recreation. The recreational uses for this receiving water are identified below.

Table 8: Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies /100 mL

- The **water supply uses** are domestic, agricultural, industrial, and stock watering.
- The **miscellaneous freshwater use**s are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

EVALUATION OF SURFACE WATER QUALITY-BASED EFFLUENT LIMITS FOR NUMERIC CRITERIA

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants—their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of Ecology's RIVPLUM.xls spreadsheet and were compared with analysis by CORMIX for a single port diffuser. While RIVPLUM determines a slightly more restrictive acute dilution factor than CORMIX at 10:1 vs. 12.5:1 respectively, the CORMIX chronic dilution factor is more restrictive than RIVPLUM at 37:1 vs. 47:1 respectively. The RIVPLUM model does not allow for outfalls other than sidebank and submerged discharges. The CORMIX model models on the actual spatial design of the outfall and in the writer's opinion is more representative of actual conditions. The CORMIX dilution factors determined to be (from Appendix C) are contained in Table 9.

Table 9: Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	13	37

Ecology determined the impacts of BOD_5, pH, ammonia, and temperature as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

BOD_5--With technology-based limits, this discharge results in a small amount of BOD loading relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

Fecal Coliform Bacteria -- Ecology modeled the fecal coliform bacteria counts at the chronic mixing dilution factor. Discharge at the technological limit does not violate the criteria for primary contact recreation. Therefore, Ecology included the technological limits for fecal coliform colonies per ml in the proposed permit.

Temperature--The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual summer maximum and supplementary spawning/rearing criteria
  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum

temperature (1-DMax).

- Incremental warming criteria

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

  At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

  When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Temperature Acute Effects

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-seconds after discharge.

  General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

  Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

TEMPERATURE TMDL

Summer water temperatures of the Wenatchee River and some of its tributaries (Chiwaukum Creek, Icicle Creek, Little Wenatchee River, Nason Creek, Mission Creek, and Peshastin Creek) are warmer than Washington State (the state) water quality standards that are set to protect fish. As a result, Ecology included these waters on the state's list of water-quality-impaired waters called the 303(d) list. Ecology published the completed and EPA approved a total maximum daily load (TMDL) for temperature in the Wenatchee River in August 2005. You can find more information at: http://www.ecy.wa.gov/biblio/0503011.html

The goal of the TMDL is to ensure that water bodies in the Wenatchee River watershed on the 2004 303(d) list for temperature will reach water quality standards within a reasonable period of time. This TMDL is implemented in coordination with the Wenatchee Watershed Management Plan (WWMP).

Ecology has coordinated and will continue to coordinate the development and implementation of the Wenatchee River Watershed Temperature TMDL with the WWMP and its participating entities. Ecology started development of the WWMP in 1999, and the Wenatchee Watershed Planning Unit (WWPU) unanimously approved it on April 26, 2006. You can download the plan from the following website:

http://www.co.chelan.wa.us/nr/nr_watershed_plan.htm

Ecology evaluated wasteload allocations for the National Pollution Discharge Elimination System (NPDES) discharges for the Wenatchee River basin. It calculated maximum temperatures for NPDES effluent discharges (TNPDES) using the following equation for system potential upstream temperatures greater than or equal to 16ºC (all point sources in this TMDL study discharge to waters that are designated as Class AA) or 18ºC (all point sources discharge to waters that are designated as Class A).

Class AA: TNPDES = [16ºC- 0.3 ºC] + [chronic dilution factor] * 0.3ºC

Maximum effluent temperatures should also be no greater than 33ºC to avoid creating areas in the mixing zone that would cause instantaneous lethality.

Table 9 contains the point source WLAs for point source dischargers in the Wenatchee River watershed, WIRA 45.

Table 10: Wasteload Allocation (WLA)

NPDES Facility	Chronic Dilution Factor	Water Quality Standard for Temperature in Degrees C	Maximum Allowable Effluent Temperature Wasteload Allocation in Degrees C
Lake Wenatchee POTW	**214**	**16**	**33.0**
Stevens Pass POTW	**1**	**16**	**16.0**
Leavenworth POTW	**37.1**	**16**	**28.8**
Cashmere POTW	**100**	**16**	**33.0**
Peshastin POTW	**331.7**	**16**	**33.0**
Leavenworth National Fish Hatchery	**1**	**16**	**18.0**

The proposed permit includes a temperature limit based on the WLA allotment.

pH--Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the acute dilution factor of 37 :1. The receiving water input variables used are listed in Table 4 (page 14). The effluent input variables used are included in Table 3.

Ecology predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutant is present in the discharge: ammonia. Ecology conducted a reasonable potential analysis (See Appendix C) on ammonia to determine whether it would require effluent limits in this permit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station, 45A-110 Wenatchee River-Near Leavenworth, and Ecology spreadsheet tools.

No reasonable potential to violate the water quality criteria for ammonia was found. There, the proposed permit does not contain a limit for ammonia.

DISSOLVED OXYGEN AND pH TMDL CONSIDERATIONS

The Wenatchee River watershed is under 4 TMDLs which address dissolved oxygen deficiencies and high pH in the Wenatchee River watershed. Ecology revised "The Wenatchee River Watershed Dissolved Oxygen and pH Total Maximum Daily Load Report, Publication No. 08-10-062," in August 2009. You can view the published report at: http://www.ecy.wa.gov/biblio/0810062.html

The TMDL requires this point source discharger to achieve a target reduction in phosphorus loading to the river by 2020 at the end of the next permit cycle. The TMDL calls for a substantial reduction in phosphorus loads from the current loads. The proposed permit includes a compliance schedule requiring Leavenworth to meet the wasteload allocations included in the TMDL. The waste load expressed as concentration is 90 µg/L or at full flow design criteria a maximum load of 0.286 kg/Day total phosphorous.

WHOLE EFFLUENT TOXICITY

The water quality standards for surface waters forbid discharge of effluent that causes toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Using the screening criteria in chapter 173-205-040 WAC, Ecology determined that toxic effects caused by unidentified pollutants in the effluent are unlikely. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

HUMAN HEALTH

Washington's water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology determined the applicant's discharge is unlikely to contain chemicals regulated to protect human health, on existing effluent data or knowledge of discharges to their system. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

SEDIMENT QUALITY

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

GROUND WATER QUALITY LIMITS

The ground water quality standards (chapter 173-200 WAC) protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

The City of Leavenworth POTW does not discharge wastewater to the ground. No permit limits are required to protect ground water.

COMPARISON OF EFFLUENT LIMITS WITH THE PREVIOUS PERMIT ISSUED ON MARCH 23, 2005

The proposed permit limits are unchanged from the current permit with the exception of a temperature limit based on the Temperature TMDL wasteload allocation.

Table 11: Proposed Permit Limits

EFFLUENT LIMITS [a]: OUTFALL # 001		
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand (5 day)	30 mg/L; 210 lbs/day and 85% minimum removal	45 mg/L; 315 lbs/day
Total Suspended Solids	30 mg/L; 210 lbs/day and 85% minimum removal	45 mg/L; 315 lbs/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
Temperature	28.8º C maximum daily	
pH	shall not be outside the range of 6.0 to 9.0	

[a] The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.

MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41)

to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09) for an activated sludge treatment facility.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The proposed permit requires the City of Leavenworth POTW to monitor on a regular basis for BOD_5, TSS, fats, oil and grease (FOG), dissolved oxygen, fecal coliform bacteria, temperature, and total ammonia to further characterize the effluent. These pollutants could have a significant impact on the quality of the surface water. Monitoring for alkalinity, total hardness and total phosphorus have been eliminated or reduced as Ecology believes sufficient data have been collect to characterize the effluent at this time or low variability allows a monitoring frequency reduction. Temperature monitoring is increased to 5 times a week to provide the Temperature TMDL effort with more point-source data.

The POTW is required to monitor, on a limited basis, nitrite and nitrate, total phosphorus, total dissolved solids, hardness, and total kjeldahl nitrogen to support the next permit application.

LAB ACCREDITATION

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories* to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for: BOD_5, TSS, dissolved oxygen, fecal coliform bacteria, ammonia, and pH.

OTHER PERMIT CONDITIONS

REPORTING AND RECORD KEEPING

Ecology based permit condition S3 on our authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Leavenworth

POTW to take the actions detailed in proposed permit requirement S4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains Condition S5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure The City of Leavenworth POTW takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

PRETREATMENT

Duty to Enforce Discharge Prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "Pass-through" or "Interference". This general prohibition is from 40 CFR §403.5(a). Appendix B of this fact sheet defines these terms.

- The second section reinforces a number of specific State and Federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:

    - Are prohibited due to dangerous waste rules.
    - Are explosive or flammable.
    - Have too high or low of a pH (too corrosive, acidic or basic).
    - May cause a blockage such as grease, sand, rocks, or viscous materials.
    - Are hot enough to cause a problem.
    - Are of sufficient strength or volume to interfere with treatment.
    - Contain too much petroleum-based oils, mineral oil, or cutting fluid.
    - Create noxious or toxic gases at any point.

    40 CFR Part 403 contains the regulatory basis for these prohibitions , with the exception of the pH provisions which are based on WAC 173-216-060.

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:

- Cooling water in significant volumes.
- Stormwater and other direct inflow sources.
- Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Federal and State Pretreatment Program Requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR, part 403. Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) (40 CFR 403.8 (f)(1)(i) and(iii)).

Industrial dischargers must obtain a permit from Ecology before discharging waste to the City of Leavenworth POTW (WAC 173-216-110(5)). Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

Routine Identification and Reporting of Industrial Users

The permit requires non-delegated POTWs to take "continuous, routine measures to identify all existing, new, and proposed significant industrial users (SIUs) and potential significant industrial users (PSIUs)" discharging to their sewer system. Examples of such routine measures include regular review of water and sewer billing records, business license and building permit applications, advertisements, and personal reconnaissance. System maintenance personnel should be trained on what to look for so they can identify and report new industrial dischargers in the course of performing their jobs. The POTW may not allow SIUs to discharge prior to receiving a permit, and must notify all industrial dischargers (significant or not) in writing of their responsibility to apply for a State Waste Discharge Permit. The POTW must send a copy of this notification to Ecology.

Support by Ecology for Developing Partial Pretreatment Program by POTW

As sufficient data becomes available, the City of Leavenworth must, in consultation with Ecology, reevaluate its local limits in order to prevent pass-through or interference. If any pollutant causes pass-through or interference, or exceeds established sludge standards, the City of Leavenworth must establish new local limits or revise existing local limits as required by 40 CFR 403.5. In addition, Ecology may require revision or establishment of local limits for any pollutant that causes a violation of water quality standards or established effluent limits, or that causes whole effluent toxicity.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern.

SOLID WASTE CONTROL

To prevent water quality problems the facility is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Chelan County Health Department.

GENERAL CONDITIONS

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual municipal NPDES permits issued by Ecology.

COMPLIANCE SCHEDULE

The Permittee must meet compliance schedule requirements under Special Condition S9 of the proposed permit. In order to comply with a total phosphorous wasteload allocation contained in The Wenatchee River Watershed Dissolved Oxygen and pH Total Maximum Daily Load Water Quality Improvement Report. The waste load expressed as a concentration is 90 µg/L or at full flow design criteria a maximum load of 0.286 kg/Day total phosphorous.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for ground waters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

PROPOSED PERMIT ISSUANCE

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life,

and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. *National Toxics Rule.* Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling.* USEPA Office of Water, Washington, D.C.

1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.

1983. *Water Quality Standards Handbook.* USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.

1972. *Characterization of Stream Reaeration Capacity*. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

2006. *Permit Writer's Manual.* Publication Number 92-109 (http://www.ecy.wa.gov/biblio/92109.html)

Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

Water Pollution Control Federation.

1976. *Chlorination of Wastewater.*

Wright, R.M., and A.J. McDonnell.

1979. *In-stream Deoxygenation Rate Prediction.* Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to the City of Leavenworth POTW. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice of Draft on June 9, 2010 in the Wenatchee World to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice –

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.

NOTICE: ANNOUNCEMENT OF AVAILABILITY OF DRAFT PERMITS

Draft Permits have been completed for the following permittees for a National Pollutant Discharge Elimination System (NPDES) Permit in accordance with the provisions of Chapter 90.48 Revised Code of Washington (RCW), Chapter 173-220 Washington Administrative Code (WAC), and the Federal Clean Water Act.

Following evaluation of the applications and other available information, draft permits have been developed for:

Permittee: City of Leavenworth, Permit No. WA-002097-4 which would allow the discharge of treated municipal wastewater up to a maximum of 840,000 gallons per day to the Wenatchee River at River Mile 24 from its facility located at 1402 Commercial Street, Leavenworth.

Permittee: City of Wenatchee, Permit No. WA-002394-9 which would allow the discharge of municipal wastewater to a maximum of 5.5 million gallons per day to the Columbia River at River Mile 466.6 from its facility located at 201 North Worthen Street, Wenatchee.

All discharges to be in compliance with the Department of Ecology's Water Quality Standards for a permit to be issued.

A tentative determination has been made to issue these permits based on the effluent limitations and special permit conditions that will prevent and control pollution. A final determination will not be made until all timely comments received in response to this notice have been evaluated.

PUBLIC COMMENT AND INFORMATION
The draft permits and fact sheets may be viewed at the Department of Ecology (Department) website: http://www.ecy.wa.gov/programs/wq/permits/central_permits.html. The applications, fact sheets, proposed permits, and other related documents are also available at the Department's Central Regional Office for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m., weekdays. To obtain a copy or to arrange to view copies at the Central Regional Office, please call Cindy Huwe at 509/457-7105, e-mail cynthia.huwe@ecy.wa.gov, or write to the address below.

Interested persons are invited to submit written comments regarding the proposed permits. All comments must be submitted by July 9, 2010 (within 30 days of the final date of publication of this notice) to be considered for the final determination. Comments should be sent to: Department of Ecology, Central Regional Office, 15 West Yakima Avenue, Suite 200, Yakima, WA 98902, Attention: Cindy Huwe. E-mail comments should be sent to Cindy Huwe at cynthia.huwe@ecy.wa.gov.

Any interested party may request a public hearing on the proposed permits within 30 days of the publication date of this notice. The request for a hearing shall state the interest of the party and the reasons why a hearing is necessary. The request should be sent to the above address. The Department will hold a hearing if it determines that there is significant public interest. If a hearing is to be held, public notice will be published at least 30 days in advance of the hearing date. Any party responding to this notice with comments will be mailed a copy of a hearing public notice. Please bring this public notice to the attention of persons who you know would be interested in this matter. The Department is an equal opportunity agency. If you have a special accommodation needs, please contact Cindy Huwe at 509/457-7105 or TTY (for the speech and hearing impaired) at 1-800-833-6388.

Publication date of this Notice is June 9, 2010.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting* which is available on our website at http://www.ecy.wa.gov/biblio/0307023.html. You may obtain further information from Ecology by telephone, 509 457 7105, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

The primary author of this permit and fact sheet is Richard Marcley.

APPENDIX B--GLOSSARY

1-DMax or **1-day maximum temperature** - The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or **7-day average of the daily maximum temperatures** - The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute Toxicity—The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART – The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Ambient Water Quality—The existing environmental condition of the water in a receiving water body.

Ammonia—Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual Average Design Flow (AADF)—The average of the daily flow volumes anticipated to occur over a calendar year.

Average Monthly Discharge Limit—The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)—Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5—Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass—The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine—Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity—The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)—The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite Sample—A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity—Clearing, grading, excavation, and any other activity which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous Monitoring—Uninterrupted, unless otherwise noted in the permit.

Critical Condition—The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor (DF)—A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report—A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria—Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample—A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater—Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility—A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limit—The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum Day Design Flow (MDDF)—The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum Month Design Flow (MMDF)— The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum Week Design Flow (MWDF)— The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method Detection Level (MDL)—The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Minor Facility—A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone—An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)—The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH—The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Peak Hour Design Flow (PHDF)—The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak Instantaneous Design Flow (PIDF)—The maximum anticipated instantaneous flow.

Quantitation Level (QL)— The smallest detectable concentration of analyte greater than the Method Detection Limit (MDL) where the accuracy (precision &bias) achieves the objectives of the intended purpose.

Reasonable Potential — A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible Corporate Officer—A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit—A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)—Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State Waters—Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater—That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset—An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit—A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's homepage at http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html.

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT				
1. DILUTION FACTOR AT CHRONIC MIXING ZONE BOUNDARY	37.00	37.00	37.00	37.00
1. UPSTREAM/BACKGROUND CHARACTERISTICS	Ambient at Max pH		Ambient at Min pH	
Temperature (deg C):	20.30	20.30	20.30	20.30
pH: MAX Based on the 95th percentile	8.20	8.20	6.80	6.80
Alkalinity (mg CaCO3/L):	28.00	28.00	28.00	28.00
	Effluent @ Max pH	Effluent @ Min pH	Effluent @ Max pH	Effluent @ Min pH
2. EFFLUENT CHARACTERISTICS				
Temperature (deg C): Maximum report temperature	23.70	25.00	25.00	25.00
pH:	8.50	6.50	8.50	6.50
Alkalinity (mg CaCO3/L): Average	26.90	208.00	208.00	208.00
OUTPUT				
1. IONIZATION CONSTANTS				
Upstream/Background pKa:	6.38	6.38	6.38	6.38
Effluent pKa:	6.36	6.35	6.35	6.35
2. IONIZATION FRACTIONS				
Upstream/Background Ionization Fraction:	0.99	0.99	0.72	0.72
Effluent Ionization Fraction:	0.99	0.59	0.99	0.59
3. TOTAL INORGANIC CARBON				
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	28.42	28.42	38.64	38.64
Effluent Total Inorganic Carbon (mg CaCO3/L):	27.09	355.25	209.47	355.25
4. CONDITIONS AT MIXING ZONE BOUNDARY				
Temperature (deg C):	20.39	20.43	20.43	20.43
Alkalinity (mg CaCO3/L):	27.97	32.86	32.86	32.86
Total Inorganic Carbon (mg CaCO3/L):	28.39	37.26	43.26	47.20
pKa:	6.38	6.38	6.38	6.38
pH at Mixing Zone Boundary:	8.21	7.25	6.88	6.74

Bacteriological Mass Balance Model
Leavenworth POTW to the Wenatchee River

CHRONIC DILUTION 278 :1

Dilution Calculator	Effluent colonies per ml	Dilution Calculator	Final colony count	Dilution factor
36.1	400	1300	205	37
36.1	200	1300	13	37

EAP DATA 2001 - 2008

date	ALK	FC	FLOW	NH3_N	NO2_NO3	OP_DIS	OXYGEN	PH	TEMP
	14	4	880	0.01	0.01	0.0031	10.31	7.33	11.4
10/10/2007		1	1260	0.01	0.016	0.003	12.24	7.54	5.4
11/14/2007	12	1	2190	0.01	0.065	0.003	12.75	7.2	2.9
12/12/2007			957						
1/9/2008	17	1	880	0.01	0.05	0.003	13.16	7.24	1.1
2/19/2008		1	1410	0.01	0.03	0.0031	12.72	7.6	3.6
3/19/2008	17	1	2150	0.01	0.052	0.003	12.4	7.48	4.7
4/16/2008		2	5130	0.01	0.092	0.003	11.8	7.4	6.1
5/7/2008	9.5	1	10300	0.01	0.071	0.0031	11.41	7.05	6.8
6/4/2008		1	5890	0.01	0.033	0.003	10.1	7.19	12
7/9/2008	14	3	1180	0.011	0.01	0.003	9.1	7.38	16.1
8/13/2008		3	697	0.01	0.01	0.003	9.6	7.48	13.9
9/10/2008		2	254	0.01	0.012	0.004	10.92	7.18	9
10/9/2006		15	2800	0.01	0.057	0.003	11.93	7.43	4.5
11/14/2006		1		0.01	0.058	0.0033	12.88	7.54	2
12/13/2006		1	1700	0.01	0.065	0.0037	13.36	6.86	1.2
1/8/2007		1	779	0.01	0.058	0.003	13.43	7.26	0.9
2/5/2007		3	974	0.01	0.027	0.003	12.75	7.32	2.9
3/5/2007		1	4150	0.01	0.064	0.0041	12.75	7.29	5
4/9/2007		12	4990	0.01	0.059	0.003	11.63	7.37	6.6
5/8/2007		1	5170	0.01	0.042	0.0031	11.63	7.46	7.6
6/12/2007		2	3990	0.01	0.018	0.0044	10.4	7.6	12.9
7/9/2007		11	667	0.01	0.013	0.003	9.27	7.46	16.5
8/15/2007		1	382	0.01	0.01	0.003	9.69	7.54	14
9/11/2007		5	514	0.01	0.01	0.003	10.41	7.64	10.4
10/3/2005		4	693	0.01	0.01	0.003	11.42	6.95	6.1
11/7/2005		2	559	0.01	0.045	0.0034	13.46	7.21	1
12/5/2005		1	2030	0.01	0.074	0.003	12.68	7.59	2.5
1/11/2006		1	1010	0.01	0.056	0.003	13.06	7.13	1.8
2/6/2006		1	686	0.01	0.05	0.003	12.88	7.28	2.7
3/6/2006		1	1780	0.01	0.046	0.0042	12.37	7.44	3.8
4/10/2006		3	4330	0.01	0.08	0.003	11.85	7.62	5.9
5/8/2006		4	9960	0.01	0.062	0.0033	11.75	7.57	6.6
6/6/2006		5	2060	0.01	0.023	0.003	9.79	8.11	13.4
7/17/2006		8	630	0.01	0.013	0.003	9.38	7.28	15.7
8/14/2006		6	368	0.01	0.013	0.003	9.58	7.32	13.8
9/11/2006		24	798	0.01	0.01	0.003	10.55	7.3	10.1
10/4/2004		10	1320	0.01	0.01	0.003	11.87	7.08	5.7
11/1/2004		3	1680	0.01	0.057	0.003	12.12	6.85	3.3
12/6/2004		3	1750	0.01	0.065	0.0067	13.16	6.87	2.3
1/3/2005		1	3320	0.01	0.07	0.0037	12.79	6.99	2.3
2/7/2005		1	1550	0.01	0.046	0.003	12.24	7.46	4.3
3/7/2005		1	1910	0.01	0.048	0.003	12.14	7.16	4.3
4/4/2005		1	4540	0.01	0.064	0.0037	11.53	7.11	7.1
5/2/2005		6	3020	0.01	0.029	0.003	10.91	7.06	9
6/6/2005		13	1280	0.01	0.012	0.003	9.69	8.59	13.9
7/11/2005		19	590	0.01	0.012	0.003	8.71	7.32	18.8
8/1/2005		4	367	0.01	0.01	0.003	9.79	7.26	13.5
9/12/2005									
10/7/2002	22	6	162	0.01	0.01	0.003	13.4	7.01	0.1
11/4/2002	15	1	471	0.01	0.028	0.0034	12.3	7.27	3.5
12/2/2002	15	1	565	0.01	0.047	0.003	12.9	6.83	2.7
1/6/2003	12	3	2430	0.01	0.063	0.003	12.5	7.22	3.5
2/3/2003	15	2	785	0.01	0.043	0.0033	12.8	6.89	2.6
3/3/2003	14	1	2060	0.01	0.045	0.003	12.5	7.06	5
4/7/2003	13	1	3640	0.01	0.055	0.003	12.08	6.95	6.7
5/5/2003	10	2	7360	0.01	0.052	0.0031	11.67	7.74	7.6
6/2/2003	10	1	2490	0.01	0.015	0.0035	10.15	7.74	14.2
7/7/2003	13	6	792	0.01	0.01	0.003	9.84	7.13	16.5
8/4/2003	23	9	425	0.01	0.01	0.003	9.64	7.47	15.7
9/8/2003			217	0.01	0.012	0.003	10.9	7.66	7.8
10/10/2001			884	0.01	0.023	0.003	11.31	7.43	6.7
11/14/2001			928	0.01	0.051	0.003	12.2	6.79	3.2
12/5/2001			4600	0.01	0.065	0.003	12.46	7.28	2.9
1/9/2002			813	0.01	0.05	0.003	13.13	7.14	1.5
2/6/2002			1310	0.01	0.051	0.003	12.82	8.39	2.6
3/6/2002			1300	0.01	0.021	0.0032	12.6	6.98	3.3
4/3/2002			3370	0.011	0.051	0.003	12.4	7.07	4.9
5/8/2002	9.38		8860	0.01	0.058	0.003	11.6	6.98	7
6/4/2002	8.7		5220	0.01	0.028	0.003	10.8	7.19	10.2
7/10/2002	12		1200	0.01	0.011	0.003	10.19	6.99	11.7
8/7/2002	15		493	0.01	0.014	0.003	9.3	6.88	14.3
9/11/2002		2	921	0.01	0.01	0.005	10.7	8.51	8.3
10/3/2000		1	661	0.01	0.01	0.005	11.7	8.38	4.5
11/7/2000		2	377	0.01	0.03	0.005	14.21	7.35	4
12/5/2000		1	377	0.01	0.026	0.005	13.23	7.91	0.3
1/16/2001		1	370	0.01	0.029	0.005	13.36	7.8	2.2
2/6/2001		1	311	0.01	0.018	0.005	12.62	8.23	4.8
3/6/2001		1	1040	0.01	0.04	0.005	12.32	7.99	4.9
4/3/2001		1	2360	0.01	0.063	0.005	11.1	7.7	9.3
5/8/2001		1	3030	0.01	0.053	0.005	10.9	7.84	8.8
6/5/2001		1	1680	0.01	0.015	0.005	9.35	8.18	17.3
7/10/2001		6	588	0.01	0.011	0.005	9.07	8.02	20.3
8/14/2001		3	430	0.01	0.011	0.005	9.2	8.17	17.4
10/6/2003	18	1	311	0.01	0.01	0.003	10.02	7.27	12.5
11/3/2003	11.5	3	1390	0.01	0.038	0.003	11.97	7.19	5
12/7/2003	12.3	2	1370	0.01	0.056	0.003	12.34	7.25	3.2
1/12/2004	15		695	0.01	0.051	0.003	13.26	6.46	1.2
2/9/2004	15	1	921	0.01	0.051	0.003	13.46	6.69	1.1
3/8/2004	17	1	1050	0.01	0.043	0.003	12.5	7.1	3.8
4/12/2004	12	1	4460	0.01	0.075	0.003	11.91	6.87	5.9
5/3/2004	11	5	6390	0.01	0.057	0.003	11.31	7.1	7.4
6/7/2004	9.7	5	4650	0.01	0.038	0.003	10.7	6.96	9
7/12/2004	12	6	1190	0.01	0.012	0.003	10.6	6.7	14.7
8/2/2004	14	23	877	0.01	0.013	0.003	8.46	6.9	18.3
9/13/2004	14	13	699	0.01	0.01	0.003	9.94	7.66	13
MAX	23	24	10300	0.011	0.092	0.0067	14.21	8.59	20.3
AVG	14	4	2042	0	0	0	12	7	7
MIN	8.7	1	162	0.01	0.01	0.003	8.46	6.46	0.1
							95th	8.1975	
							5th	6.843	

REASONABLE POTENTIAL CALCULATIONS

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

				State Water Quality Standard		Max concentration at edge of...										
Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Conc (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samp	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L			Pn	ug/L	CV	s	n			
AMMONIA Max Day	0.95	0.95	11.00	3500.00	570.00	226.33	83.55	NO	0.95	0.95	2800.00	0.60	0.55	55.00	1.02	12.50	37.10

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

INPUT	pH @ambient
1. Ambient Temperature (deg C; 0<T<30)	20.3
2. Ambient pH (6.5<pH<9.0) at edge	8.20
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15
OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.00
RATIO	14
pKa	9.39
Fraction Of Total Ammonia Present As Un-ionized	6.0461%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	260.0
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	42.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	4.3
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	0.7
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	3.5
Chronic Ammonia Criterion as N	0.57

EFFLUENT DMR DATA

	ALKA	BOD	BOD	BOD	BOD	BOD	FECAL	FECAL	FLOW	FLOW	HARD	AMMON	AMMON	AMMON	AMMON	(DO)	(DO)	PH	PH	T-P	TSS	TSS	TSS	TSS	TSS	TEMP	TEMP	TEMP	TEMP
	AVG	AVG	AVG	AVG	AVW	AVW	GEM	GM7	AVG	MAX	AVG	AVG	AVG	MAX	MAX	AVG	MIN	MAX	MIN	AVG	AVG	AVG	AVG	AVW	AVW	AVG	AVG	MAX	MAX
	MG/L	LBS/DAY	MG/L	PERCENT	LBS/DAY	MG/L	#/100 ML	#/100 ML	MGD	MGD	MG/L	LBS/DAY	MG/L	LBS/DAY	MG/L	MG/L	MG/L	S.U.	S.U.	MG/L	LBS/DAY	MG/L	PERCENT	LBS/DAY	MG/L	°C	°C	°C	°C
	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Summer
I FAVFNWORTH POTW																													
WA0020974D																													
DMR (MONTHLY)												1.825																	
EFFLUENT												1.2																	
1-Nov-06	20	10.04	4.2	97	21.12	7.6	2	6	0.37	0.717	50	0.5219	0.245	0.5705	0.25	6.41	2.12	6.78	6.39	3.9	13.53	5.72	96	26.04	10	12.9		14.4	
1-Dec-06	23.33	8.65	3	99	14.56	4.3	1.1	2	0.35	0.441	70	0.6785	0.24	0.7126	0.24	6.6	5.71	6.62	6.17	4.2	14.17	4.95	97	21.25	7	11.4		12.5	
1-Jan-07	27.5	10	3.7	98	17.94	7.6	1.5	3	0.364	0.465	55	0.5572	0.21	0.6257	0.22	6.64	5.22	6.51	6.12	2.2	15.3	5.8	95	25.02	10.6	9.9		11.9	
1 Feb 07	22.5	13	4.4	97	16.4	5.7	1.5	2.5	0.394	0.585	60	0.6743	0.245	0.7606	0.25	7.32	6.49	6.64	6.19	5	24.4	8.6	94	29.82	13	9.9		11	
1-Mar-07	22.5	19	6	95	25.26	7.7	1.4	5	0.372	0.554	75	0.766	0.2	0.924	0.2	8.48	7.25	8.48	6.15	3.4	36.6	11.78	85	42.22	13.6	10.6		12	
1-Apr-07	25	13.17	5.7	97	18.76	8.3	1.8	4	0.369	0.462	60	0.782	0.33	0.785	0.34	7.93	5.63	6.97	6.04	3.7	29	11.3	94	32.26	12.6	13.2		14.6	
1-May-07	20	13	5.2	97	16.99	7.1	2.2	6.5	0.37	0.481	60	0.567	0.255	0.609	0.29	6.02	5.46	6.58	5.99	2.9	20	7.84	95	27.22	9.6	16		18	
1-Jun-07	17.5	13.29	5.5	97	23.44	9	7	12	0.353	0.436	45	0.638	0.27	0.696	0.28	5.99	5.17	6.4	6.02	6.3	21.52	9.18	96	33.4	12.4	18.6	18.6	20.4	20.4
1-Jul-07	15	14	4.9	98	21.9	7.7	6	16	0.378	0.434	45	0.574	0.21	0.616	0.22	5.31	4.6	6.33	6.03	4.3	27	9.3	96	54.1	19.9	21.6	21.6	22.5	22.5
1-Aug-07	17.5	9	3.1	99	11.11	3.7	6.3	20	0.377	0.439	40	0.791	0.285	0.796	0.3	5.13	4.75	6.47	6.01	6.1	17.7	6.1	97	23.77	7.9	21.7	21.7	22	22
1-Sep-07	20	7	2.5	99	7.71	2.8	3.8	11	0.343	0.494	50	0.615	0.22	0.615	0.22	5.38	4.6	6.48	6.11	1.3	14.2	5.4	97	18.71	6.8	19.9	19.9	21.8	21.8
1-Oct-07	22.5	9	3.7	99	12.11	4.7	2.6	20	0.325	0.441	50	0.291	0.145	0.314	0.15	5.34	4.7	6.88	6.05	3.8	14.8	6.6	97	23.71	9.2	16.9		18	
1-Nov-07	20	9	4.1	98	11.85	5.9	1.9	5.5	0.279	0.377	50	0.566	0.23	0.644	0.24	6.36	5.6	6.7	6.25	4.1	11.2	5.31	97	23.33	12.6	13.5		15	
1-Dec-07	20	17	5.8	97	25.83	8.8	1.1	1.5	0.373	0.567	50	0.552	0.24	0.653	0.26	6.27	5.01	6.73	6.03	2.8	26	8.9	95	44.04	15	11.3		12.6	
1-Jan-08	25	14	5.9	97	19.66	7.1	1.6	5.5	0.308	0.41	50	0.508	0.23	0.556	0.23	6.45	5.5	6.69	6.17	1.9	16.7	7.2	95	25.2	10.2	9.5		11.8	
1-Feb-08	20	17	6.4	96	21.29	7.4	1.5	2	0.348	0.45	55	0.79	0.33	0.891	0.38	6.76	6.07	6.67	6.18	1.8	28.3	10.8	95	38.56	13.4	9.7		10.8	
1 Mar 08	20	20	6.3	96	24.14	7.5	1.5	2.5	0.415	0.484	60	0.699	0.225	0.876	0.25	7.22	6.46	6.8	6.4	2.1	31.4	10	94	41.18	12.5	10.2		10.8	
1-Apr-08	20	12	4.8	98	16.86	6.9	1	1	0.33	0.386	60	0.543	0.265	0.558	0.265	6.64	5.81	6.54	6.03	1.1	20.2	8.3	95	24.44	10	12.3		14.1	
1-May-08	15	17	7	97	20.06	8.1	1.5	5	0.337	0.444	60	0.721	0.305	0.839	0.33	5.27	4.03	6.42	6.03	4.4	24.7	10.13	94	33.19	13.4	16.2		18.3	
1-Jun-08	15	12	4.8	98	18	6.9	5.5	7.5	0.341	0.443	60	0.68	0.285	0.687	0.3	5.68	4.3	6.5	6.04	4.2	19.4	7.85	95	23.83	10.7	18.1	18.1	21	21
1-Jul-08	20	17	4.7	98	21.46	6.4	4.3	11.5	0.387	0.46	50	0.781	0.29	0.8375	0.31	5.98	5.38	6.76	6.15	4.4	24.6	8.4	95	33.85	10.3	20.9	20.9	21.5	21.5
1-Aug-08	25	11	3.5	98	13.54	4	5.9	8	0.405	0.469	40	0.729	0.24	0.734	0.25	6.52	5.03	6.57	6.1	1.8	25.5	8.26	95	36.86	10.6	21.2	21.2	23.2	23.2
1-Sep-08	25	8	2.9	99	10.44	3.4	3.5	8	0.318	0.446	40	0.544	0.24	0.594	0.27	6.26	5.44	6.62	6.17	0.7	15.3	5.73	95	22.71	7.4	19.1	19.1	19.9	19.9
1-Oct-08	40	7	3	99	13.47	5.4	5.1	8	0.28	0.411	50	0.434	0.21	0.493	0.23	6.91	6.1	6.77	6.55	4.9	9.7	4.02	98	16.03	6.3	16.6		18.8	
1-Nov-08	30	6	2.6	99	7.78	3.4	1.9	3	0.301	0.81	45	0.43	0.16	0.536	0.16	7.27	6.36	6.97	6.51	2.8	8.7	3.6	97	12.87	4.9	13.5		15.7	
1-Dec-08	25	12.29	4.5	90	21.29	5.8	1.2	1.5	0.376	0.518	40	1	0.2	1	0.2	6.87	5.72	6.69	6.1	2.3	26.2	9.09	95	36.78	10.8	11.5		13.7	
1-Jan-09	30	13	4.1	0.97	20.38	5.2	1.4	6	0.384	0.52	50	1	0.467	0.56	0.2	8.73	6.28	6.7	6.18	3.2	3.1	0.97	0.99	38.16	9	9.8		11.9	
1 Feb 09	27.5	22	9.97	98	10.72	5.1	1.1	2	0.265	0.356	45	0.501	0.23	0.594	0.25	7.62	6.83	6.75	6.38	4.1	23.5	10.64	92	14.86	7.1	10.8		11.9	
1-Mar-09	30	15	4.9	97	27.78	7.8	4	4	0.395	0.59	60	0.75	0.24	0.807	0.25	7.73	6.22	6.77	6.4	3.5	2.9	0.97	99	44.16	12.4	10.7		12.4	
1-Apr-09	32.5	8.06	3.6	98	11.9	5.8	1.2	1.5	0.323	0.407	50	0.514	0.255	0.616	0.32	6.91	6.12	6.82	6.4	2.9	2.3	0.99	99	13.31	6.2	13.9		15.7	
1-May-09	40	8	3.2	99	9.84	4.2	1.6	4.5	0.33	0.453	50	0.495	0.23	0.591	0.26	6.38	6.01	6.74	6.2	4	2.4	0.99	100	13.23	6.5	16.9		19.1	
1-Jun-09	25	10	3.8	98	12.09	4.3	5	9	0.321	0.377	40	0.717	0.255	0.734	0.27	6.94	5.76	6.79	6.3	3	2.7	0.99	1	21.08	7.7	20.3	20.3	20.8	20.8
1-Jul-09	20	11.67	4.3	98	18.59	7.1	9.9	5	0.381	0.442	40	0.714	0.25	0.738	0.25	7.42	4.78	6.61	6.35	4.8	18.32	0.98	1	24.24	9	22.4	22.4	24.5	24.5
1-Aug-09	20	10.04	3.6	99	16.73	5.1	11.9	21	0.38	0.437	40	0.753	0.26	0.785	0.27	5.71	5.27	6.77	6.43	3.7	2.9	0.99	100	23.67	8	22.6	22.6	24	24
1-Sep-09	24	6.23	2.7	99	15.47	7	6.2	10.5	0.339	0.43	40	0.574	0.25	0.628	0.25	5.97	5.27	6.6	6.58	3.6	2.5	0.99	100	33.3	13.4	21.5	21.5	23.2	23.2
1-Oct-09	27.5	4.73	2.3	99	9.28	4.9	4.3	10	0.328	0.507	40	0.496	0.205	0.563	0.22	6.36	5.43	6.66	6.27	2.8	4.44	0.99	99	6.35	3.2	17.6		19	
1-Nov-09	30	5.27	2.9	99	7	3.6	2.9	5.5	0.294	0.434	40	0.528	0.235	0.612	0.24	6.59	5.52	6.65	6.3	4	2	0.99	99	10.88	5.8	14.7		16.2	
AVG	23.8	11.56	4.4	95.1	16.6	6.0	3.4	7.0	0.349	0.473	50.4	0.6	0.25	0.68	0.3	6.6	5.4			3.4	16.30	6.0	88.2	27.4	10.0	15.3	20.6	16.9	22.1
MAX	40.0	22.00	10.0	99.0	27.8	9.0	11.9	21.0	0.415	0.810	75.0	1.0	0.47	1.00	0.4	8.7	7.3	8.5		6.3	36.00	11.8	100.0	54.1	19.9	22.6	22.6	24.5	24.5
MIN	15.0	4.73	2.3	1.0	7.0	2.8	1.0	1.0	0.265	0.356	40.0	0.3	0.15	0.31	0.2	5.1	2.1		6.0	0.7	2.00	1.0	1.0	6.4	3.2	9.5	18.1	10.8	19.9
STDV	5.96									STDV	9.08	STDV	0.05	STDV	0.05				STDV	1.28374						95th	22.49		
COV	0.25									COV	0.18	COV	0.22	COV	0.18				COV	3.4									
												95th %tile	0.33	95th %tile	0.332														
												count	37																

INFLUENT DMR DATA

LEAVENWORTH POTW										
INFLUENT										
	FLOW	BOD	BOD	BOD	BOD	O&G	TSS	TSS	TSS	TSS
	AVG	AVG	AVG	MAX	MAX	AVG	AVG	AVG	MAX	MAX
	MGD	LBS/DAY	MG/L	LBS/DAY	MG/L	MG/L	LBS/DAY	MG/L	LBS/DAY	MG/L
		Value	Value	Value	Value	Value	Value	Value	Value	Value
1-May-05	0.338	110	135.5	740	195	*44.38*	88.49	108	702.02	185
1-Jun-05	0.380	477	178.89	687	255	*49.1*	306	114.78	502	176
1-Jul-05	0.437	512	170.11	683	234	*39.9*	334.28	110.56	444.36	148
1-Aug-05	0.437	525	148	742	206	*38.5*	353.81	99.63	461.05	131
1-Sep-05	0.406	409	127.9	730	220	*163.39*	406.53	125.67	566.4	163
1-Oct-05	0.385	397	135	498	160	*57.8*	358.79	122.13	442.46	148
1-Nov-05	0.340	270	104.89	369	151	*71.8*	241.19	92.22	364.22	119
1-Dec-05	0.405	312	104.11	516	161	*45.9*	449.92	141.67	719.68	210
1-Jan-06	0.431	260	74.5	429	109	*45.2*	394.94	118.75	622.06	161
1-Feb-06	0.453	277	76.63	727	184	*66.1*	467.87	129.13	830.16	210
1-Mar-06	0.410	227	69.7	448	148	*71.9*	527.42	117.2	375.91	186
1-Apr-06	0.356	330	116.63	527	183	*32.1*	531.68	189.38	772.08	263
1-May-06	0.345	359	136.78	493	199	*42.8*	602.77	228.44	832.67	312
1-Jun-06	0.364	528	198.78	850	368	*45*	476.2	176.71	712.82	269
1-Jul-06	0.410	420	131.13	555	185	*2.4*	455.76	142.75	601.61	179
1-Aug-06	0.396	486	158	754	238	*2.4*	472.01	153.1	786.89	2561
1-Sep-06	0.367	314	110.75	494	179	*173.34*	471.09	166.88	925.59	349
1-Oct-06	0.343	476	183.63	559	207	*36.4*	344.1	131.88	526.13	185
1-Nov-06	0.370	443	165.23	870	299	*21.5*	421.67	154.9	1022	351
1-Dec-06	0.402	710	218.88	987	288	*51.2*	482.04	148.5	762.96	237
1-Jan-07	0.364	464	160.67	653	196	*23.3*	368	126.22	611.53	175
1-Feb-07	0.394	455	155.38	619	196	*53.6*	395.01	135.63	519.82	163
1-Mar-07	0.418	389	118.67	505	141	*24.9*	260.3	78.67	364.02	108
1-Apr-07	0.369	541	192.63	743	274	*29.4*	512.98	182.25	818.57	302
1-May-07	0.370	570	194.7	737	263	*36*	494.94	167.6	711.24	232
1-Jun-07	0.353	534	196.63	787	293	*53.1*	551.81	204	1262	470
1-Jul-07	0.378	647	220	977	320	*814*	681.32	229.25	1600	539
1-Aug-07	0.377	679	230.6	884	301	*104*	589.97	200.4	992.26	338
1-Sep-07	0.343	600	226.5	740	273	*50.4*	551.93	209	814	306
1-Oct-07	0.325	626	255.78	752	305	*51.3*	491.74	199	748.68	235
1-Nov-07	0.279	536	264.22	639	307	*60.8*	377.2	186.22	480.87	254
1-Dec-07	0.373	671	231.25	880	278	*28.2*	463.4	164.5	683.1	265
1-Jan-08	0.308	509	210.9	957	302	**54.9**	351.87	145.5	697.22	220
1-Feb-08	0.348	479	178.13	642	229	**60**	395.34	148.75	583.57	213
1-Mar-08		488	147.88	840	250	**28.6**	537.92	163.13	1197	356
1-Apr-08	0.330	570	218.44	735	315	**41.9**	426.6	165.44	744.93	319
1-May-08	0.337	573	220	779	270	**45.8**	460.4	176.33	657.93	228
1-Jun-08	0.341	603	237.13	704	274	**23.1**	410.55	162.13	517.41	220
1-Jul-08	0.387	694	227.9	771	265	**46.1**	507.84	166.4	758.71	252
1-Aug-08	0.405	663	210	753	246	**48.8**	531.85	168.25	569.21	182
1-Sep-08	0.318	576	232.13	629	258	**169.59**	481.86	194	592.32	267
1-Oct-08	0.280	472	227.9	675	329	**55.3**	343.65	164.9	570.36	278
1-Nov-08	0.301	457	201.38	589	279	**48**	344.14	142.25	478.97	227
1-Dec-08	0.376	633	218.67	849	248	**45.1**	525.19	181.56	822.06	243
1-Jan-09	0.418	477	145.78	894	235	**20.3**	356.23	97.89	765.95	136
1-Feb-09	0.294	465	208.75	594	273	**30.2**	310.89	138.5	405.11	180
1-Mar-09	0.395	570	183.63	741	242	**33.3**	487.83	155	648.89	212
1-Apr-09	0.323	548	215.5	690	274	**22.5**	463.94	183	678.88	296
1-May-09	0.330	674	270.63	1066	407	**171**	682.6	272	1597	610
1-Jun-09	0.360	658	240.13	750	264	**51.1**	635.65	233.63	784.27	310
1-Jul-09	0.381	751	253.8	986	353	**21**	675.24	228.7	1031	369
1-Aug-09	0.380	789	269.13	1081	374	**31.9**	740.7	253.25	1135	376
1-Sep-09	0.339	613	238.44	713	283	**23.5**	517.46	200.44	704.56	240
1-Oct-09	0.328	596	249.78	770	287	**56.1**	452.84	189.78	589.18	237
1-Nov-09		507	239.38	582	278	**50.3**	378.57	176.88	604.43	282
	0.366	507.6	186.1	715.7	251.8	**51.2**	453.5	163.0	722.1	294.2
	0.453	789	270.63	1081	407	**171**	740.7	272	1600	2561
	0.279	110	69.7	369	109	**20.3**	88.49	78.67	364.02	108

O&G cumulative	
AVG	**65.6**
MAX	**814**
MIN	**2.4**

BOLD = Data fron Jan 2008 to Nov 2009

pre 2008 Data		AVG	75.94094
		MAX	814

APPENDIX D--RESPONSE TO COMMENTS

No comments were received by the Department of Ecology.